

mission of heat, corrosion, &c., and to the various methods for producing draught, with a discussion of the advantages and disadvantages of the various systems.

On p. 45 there is a slip, probably arising in conversion of units: it is stated that 5.89 lbs. of oxygen are needed to burn a pound of carbon; the figure should be 2.67 lbs. In discussing the possibility of the utilisation of the heat passing away up the funnel for warming either the feed water or the air before it passes into the furnace, there is a somewhat curious remark about the heat wasted in condensing the exhaust steam from an engine by cold water in the condenser, the author stating that so far "no remedy for this evil" had been proposed. Surely it has been forgotten that since the engine can only convert into work a small portion after all of the heat it receives, there must be rejection of heat in the condenser or elsewhere. In discussing the effects of corrosion in tubes, it is laid down as an axiom that only solid drawn tubes should be used, on account of the liability of the welded tube to suffer injury by corrosion along the line of weld, a remark which is sadly significant after the late disaster to a boiler in H.M.S. *Terrible*, and the finding of the Court of Inquiry.

The next two parts deal in detail with the older forms of marine boilers, the Scotch boiler mainly, and the newer tubulous or water-tube boiler. Very full descriptions are given in the second section of the more important details in a cylindrical boiler, especially in regard to the tubes and to the stays, and the section concludes with a valuable table of weights, space occupied, &c.

The third section, on water-tube boilers, is the most complete and the most interesting, as was to be expected, the tubulous boiler now reigning almost supreme in the French navy, and its use in the French mercantile marine being fairly large. Three classes of such boilers are described in three separate chapters—the limited circulation class, type Belleville; the free circulation, types Niclausse, Babcock-Wilcox, &c.; and lastly the accelerated circulation, types Normand, Thornycroft, Yarrow, &c.

In each chapter practically every boiler of the class under description which has been actually tried in practice is illustrated and briefly explained, while very full detailed descriptions are given of one or two of the important forms, such as Belleville, Niclausse, Thornycroft, &c., with much valuable information as to their performances under steam.

The last chapter in Part iii. is devoted to an able summary of the advantages and disadvantages of the tubulous type of boiler, mainly, of course, from the point of view of the marine engineer; interesting contrasting figures of comparative weights, costs, &c., per square foot of grate render this chapter one of the most useful in the book. It is surprising how cheap these apparently complex water-tube boilers are, averaging 32*l.* per square foot of grate surface.

The four chapters in Part iv. are devoted to descriptions of boiler mountings and fittings, in particular to the automatic feed arrangements, so essential to many water-tube boilers; in these chapters the illustrations are very good.

The book undoubtedly is the most complete work on the subject issued in English up to the present, and is

well up to date; it should prove a valuable work of reference, not only to the marine engineer, but to the intelligent layman who takes an interest in the efficiency of our navy. The water-tube boiler, much as Mr. Allen may dislike it, has come to stay; in our navy it will gradually displace the old Scotch boiler, and we should be surprised if it does not eventually make headway in the mercantile marine.

Any one reading the book and anxious to ascertain the trend of opinion amongst English marine engineers on this important question should consult the papers read a month or two ago before the Institution of Civil Engineers by Mr. Milton and Sir John Durston.

H. B.

### OUR BOOK SHELF.

*The Elements of Euclid.* With Notes, &c., by I. Todhunter, D.Sc., F.R.S. New edition, revised and enlarged, by S. L. Loney, M.A. Pp. viii+332, cxxxii. (London: Macmillan and Co., 1899.)

*Essentials of Plane and Solid Geometry.* By W. Wells, S.B. Pp. viii+392. (London: Isbister and Co. Boston, D.C.: Heath and Co., 1899.)

WITHOUT altering the general character of the well-known text-book with which he has had to deal, Mr. Loney has succeeded very well in bringing it up to date. The appendix has been enlarged by the insertion of sections on poles and polars, harmonic ranges, inversion, coaxial circles, &c.; the number of exercises has been doubled, and, what is more important, the really valuable exercises have been starred and hints given for the solution of many of them. To teachers of the conservative school this new edition ought to prove very acceptable.

Mr. Wells' book is of quite another stamp. The author belongs to the progressive party, and makes no scruple of using hypothetical constructions or any abbreviations he finds convenient. In treating of parallels he uses Playfair's axiom, and the discussion of ratio and proportion is distinctly arithmetical. The exercises are numerous and often accompanied by figures; hints for solution are also given in many cases. Mr. Wells writes in a fresh and independent manner, and his book seems very likely to interest a student and develop any geometrical power he may have in the right way.

In another edition the author will, we trust, suppress the appendix (p. 386), which is almost entirely vitiated by an error of reasoning. Mr. Wells proposes, for instance, to prove that the circumference of a circle is less than the perimeter of any circumscribed polygon, and proceeds thus: "Of the perimeters of the circle and of its circumscribed polygons, there must be one perimeter such that all the others are of equal or greater length." He then proves that, given any circumscribed polygon, we can construct another one with less perimeter; and then infers the truth of the proposition. As a matter of fact, the statement quoted above is not justifiable; the perimeters of the polygons form a manifold, and this does not necessarily contain a least element; indeed, Mr. Wells shows that it does not. There may be a definite lower limit to the perimeter of a circumscribed polygon: even then, Mr. Wells brings forward no argument to show that this lower limit exists; still less that it is equal to the circumference of the circle. Strictly speaking, he brings the circumference of the circle into no relation of equality or inequality with any of the polygons: it just stands by itself at the end as at the beginning. It is as if one said: "We have a set of quantities  $x$ ,  $1.3$ ,  $1.33$ ,  $1.333$ , &c.; one of these must be at least equal to any of the rest. But this cannot be any of the decimals, because if we choose,

say, 1'3333, we can write down 1'33333, which is greater. *Therefore it must be  $x/2$* "

It is only fair to add that this unlucky paralogism seems to be a solitary blemish in an otherwise excellent book.

G. B. M.

*A Manual of Surgical Treatment.* By W. Watson Cheyne, F.R.S., and F. F. Burghard, M.S., Surgeons to King's College Hospital, London. In six Parts. Part I. Pp. xiv + 285, with 66 illustrations in the text. (London and Bombay: Longmans, Green, and Co., 1899.)

SUCH a work as this has long been wanted by senior students, house-surgeons and general practitioners, who are often left in charge of capital operations performed by surgeons of repute without any precise directions as to the treatment to be adopted in cases of emergency. But the work undertakes much more than this, for it is evident that the authors will review the whole field of surgery in the light of our present pathological knowledge, showing the modern methods of treatment and explaining why they have replaced the older plans. The present part deals with the more general subjects of inflammation, gangrene, wounds, venereal disease, tuberculosis and tumours. It treats, therefore, of those parts of surgery which, perhaps more than all others, have been affected by antiseptic treatment. Mr. Watson Cheyne is so well known as one of the most distinguished pupils of Lord Lister that no better exponent of his methods could be found, and we are here presented with a clear account of the rationale of modern treatment. Thus, amongst many other more important things, we learn why poulticing is bad in the treatment of abscess, why a chronic abscess should be scraped, but an acute abscess should only have the matter let out and the loculi broken down. The facts and reasoning are excellent, but the pleasure of reading is too often marred by the form in which they are presented, as many of the sentences seem to be constructed upon a German model. The figures which illustrate the letterpress vary greatly in quality; some are excellent, others are sketchy, whilst others again are such mere outlines as to be almost unintelligible. Dr. Silk contributes an excellent article on the subject of anæsthetics, and there is a good index to this first part of the work.

*Impressions of America.* By T. C. Porter, M.A. (Oxon.), Fellow of the Chemical Society, of the Royal Astronomical Society, and of the Physical Society of London. Illustrated with diagrams and stereoscopic views. Pp. xviii + 242. (London: C. Arthur Pearson, Ltd., 1899.)

THE impressions were obtained during a pleasure trip to Niagara, the Yellowstone Park, San Francisco, the Yosemite, Utah and Colorado Springs. The author refrains from citing any of the scientific work dealing with the remarkable features of those interesting regions, but gives a graphic account of what he himself saw, and outlines a number of interesting hypotheses to account for some of the phenomena. Some of these are interesting because they show how a man of scientific habits of thought may from a hasty glance often reach conclusions very similar to those which the specialists who have studied the subject for years have demonstrated to be correct. We cannot accept Mr. Porter's ingenious hypothesis that the spiral ridges of the trunks of many trees in the Yellowstone Park are due to unequal heating by the sun and the uniform rotation of the earth, because he does not buttress it with the necessary explanation why trees in other places in the same latitude where the sun also shines unequally and the earth rotates uniformly do not also incline to a screwy form. But the little appendix on the Gulf Stream is a neat demonstration from the study of a single bottle-chart of the seasonal

variation of the Gulf Stream and its attendant drift. Of course the deduction is not new; the fine charts of North Atlantic currents grouped for two-monthly intervals by the Meteorological Office bring it out perfectly, and the labours of American, British, and Scandinavian oceanographers, and of the Prince of Monaco, have done much to find the reasons for the observed variations. We might venture, however, to remind Mr. Porter that the course of the Gulf Stream shown on a single small scale map is as conventional and empirical a representation of oceanic circulation as the isotherms on a map of mean annual temperature are of the climates of the world. The generalisation in no way implies that the seasonal changes are unknown.

A new theory of geysers to fit the phenomena of the Yellowstone Park is also printed in the appendix in the form of a paper read to the Physical Society. It points out defects in Tyndall's well-known theory, and introduces a syphon-bend in the underground channel and the spheroidal state induced by the intense heat of the rocks as more probable explanations.

The great merit and the unique character of the book depend, however, not on the author's impressions or his theories, but on the incomparable series of photographs which he took. These are reproduced in the form of stereoscopic views, and a neat little lenticular stereoscope is supplied with the volume. The views shown in these illustrations are admirably selected and splendidly photographed. They are reproduced by the half-tone process as separate plates, and very well printed. As a diary of the observations of a man of science at leisure there is much of interest in the whole book, which has also the advantage of being brief.

H. R. M.

*Tables for Quantitative Metallurgical Analysis for Laboratory Use.* By J. James Morgan, F.C.S., Member Soc. Chem. Industry, Member Cleveland Inst. Engineers. Tables xvi. (London: Charles Griffin and Co., Ltd., 1899.)

TABLES for qualitative analysis are to be found in every chemical laboratory, and are used by every analyst at one time or another. Any attempt to supply chemists with information on quantitative analysis drawn up in the same convenient form must therefore be welcome. The present collection of tables has been carefully prepared, and is well arranged. It includes the analyses of iron ores, steel, limestone, boiler incrustation, certain slags, gaseous fuels, water, coal, and a few of the common metals and alloys. Alternative methods are not given, but the tables will be found very useful in saving the time of an analyst engaged in the examination of materials with which he is not accustomed to deal in the ordinary course of his daily work.

## LETTERS TO THE EDITOR.

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of NATURE. No notice is taken of anonymous communications.]

### Tides of the Gulf and River St. Lawrence and Bay of Fundy.

PERMIT me to invite your attention to the latest report of the engineer in charge of the survey of the tides and currents of the coast waters of Canada, Mr. W. Bell Dawson, a copy of which has been addressed to you.

This survey, commenced by the Government of Canada in 1894, is of great importance, not merely in the interest of hydrographical science, but of the large and increasing trade which finds its way along the gulf and river St. Lawrence, the greatest water-way from the North Atlantic into the northern part of the American continent, and which, like all